

## **Plasticizer compositions for nitrocellulose based resins**

### **Field of the Invention**

The invention relates to plasticizer compositions for nitrocellu-  
5 lose based resins.

### **Description of the Related Art**

Paints or pigment concentrates based on nitrocellulose based  
resins are widely used for graphic arts and several industrial coatings. The  
most important property achieved with systems based on nitrocellulose is  
10 short drying time.

It is well known that nitrocellulose based resins are not flexible  
and must be plasticized before applying. Besides that application systems  
like paints and pigment concentrates must show a viscosity which is low  
enough so that the system is pumpable. Phthalic ester type plasticizers are  
15 commonly used in these systems, but they have been criticized because of  
their environmentally harmful action.

### **Detailed Description of the Invention**

It was an object of the present invention to provide plasticizer  
compositions for nitrocellulose based resins, which overcome the difficulties  
20 and disadvantages of the prior art. It was a further object of the invention that  
paint formulations comprising those plasticizer compositions show a reduced  
viscosity compared with formulations based on phthalic acid esters like di-  
octyl phthalate (DOP). Within the present application the term "nitrocellulose  
based resins" means resins which comprise nitrocellulose. As it is known to  
25 the artisan nitrocellulose is nitrated cellulose.

According to the invention this is achieved by **plasticizer com-  
positions** for nitrocellulose based resins comprising (i) esters of fatty acids  
with 8 to 24 carbon atoms and isobutanol with the proviso that the fatty acids  
can be saturated or olefinically unsaturated, linear or branched and contain at  
30 least one epoxy group per molecule and (ii) one or more methyl esters of  
fatty acids with 16 to 18 carbon atoms with the proviso that these fatty acids

can be saturated or olefinically unsaturated, linear or branched.

Preferably these plasticizer compositions are free of phthalic ester type plasticizers and especially free of dioctylphthalate.

5 In one embodiment the plasticizer compositions of the invention contain compounds (i) and (ii) in an amount that the weight ratio of compounds (i) and (ii) is within the range 90 : 10 and 50 : 50 and especially within the range 65 : 35 and 55 : 45. In another embodiment these plasticizer compositions contain exclusively compounds (i) and (ii).

10 The invention also relates to the use of compositions comprising (i) esters of fatty acids with 8 to 24 carbon atoms and isobutanol with the proviso that the fatty acids can be saturated or olefinically unsaturated, linear or branched and contain at least one epoxy group per molecule and (ii) one or more methyl esters of fatty acids with 16 to 18 carbon atoms with the  
15 proviso that these fatty acids can be saturated or olefinically unsaturated, linear or branched **as plasticizers for nitrocellulose based resins**. As stated above the compositions are preferably free of phthalic ester type plasticizers.

As also stated above the compositions preferably contain compounds (i) and (ii) in an amount that the weight ratio of compounds (i) and (ii)  
20 is within the range 90 : 10 and 50 : 50 and especially within the range 65 : 35 and 55 : 45. Those plasticizer compositions which exclusively contain compounds (i) and (ii) are preferred.

The invention also relates to **nitrocellulose based paints** comprising (a) 100 parts by weight of at least one nitrocellulose resin , (b) 100 to  
25 200 parts by weight of an alkyd resin and (c) 0,1 to 30 parts of a plasticizer composition comprising (i) esters of fatty acids with 8 to 24 carbon atoms and isobutanol with the proviso that the fatty acids can be saturated or olefinically unsaturated, linear or branched and contain at least one epoxy group per molecule and (ii) one or more methyl esters of fatty acids with 16 to 18  
30 carbon atoms with the proviso that these fatty acids can be saturated or olefinically unsaturated, linear or branched. Those nitrocellulose based paints which are free of phthalic ester type plasticizers are preferred.

As already stated above the plasticizer compositions contain

compounds (i) and (ii) in an amount that the weight ratio of compounds (i) and (ii) is within the range 90 : 10 and 50 : 50 and especially within the range 65 : 35 and 55 : 45. Those plasticizer compositions which contain exclusively compounds (i) and (ii) are preferred.

5           The term "alkyd resins" is known to the artisan. All types of alkyd resins which are known to the artisan and especially all kinds of alkyd resins which are commercially available can be used within the context of the present invention.

10           All types of nitrocellulose based resins which are known to the artisan can be used within the context of the present invention, especially all kinds of nitrocellulose based resins which are commercially available.

#### Examples

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**IES** = Isobutyl epoxy stearate.

15           **IFAME** = Mixture of methyl esters of fatty acids. The distribution of the fatty acid individuals in these methyl esters was (% means mole-%): straight chain C12 = 0.3%, branched chain C14 = 0.4%, straight chain C14 = 1.0%, branched chain C16 = 3.7% , straight chain C16 = 4.9%, branched chain C18 = 61.4%, straight chain C18 = 4.6%, cyclic C18 = 17.5%, straight chain C20 = 0.1%, aromatic C18 = 6.1%.

20           **NC 1/2** = Cellulose nitrate (Nitrocellulose 1/2 commercially available from Nitro Química).

**Resanol 15-075** = pure coconut alkyd resin with 60% solid content and 40% xylene as solvent ("Resanol 15-075" commercially available from RESANA Química, Brasil); % means weight percent.

25           **Mix of solvents** = Mixture of 20% ethyl acetate, 17,5% butyl acetate, 12,5% butanol, 10% ethanol and 40% xylene (% means volume percent).

**DOP** = dioctyl phthalate

#### Example 1

30           (Nitrocellulose based paint)

The following compounds were mixed together in a vessel:

Mix of Solvents	278 g
Resanol 15-075	200 g
<b>IES</b>	15 g
<b>IFAME</b>	10 g

5                    Under stirring it was added under nitrogen:

NC ½	100 g
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The resulting mixture (paint) was then homogenized and the viscosity of the system was measured. It was 3700 mPas. The value of the viscosity is lower compared to the formulation of comparative example 1 which is based on dioctyl phthalate as plasticizer.

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**Comparative Example 1**

(Nitrocellulose based paint)

The following compounds were mixed together in a vessel:

Mix of Solvents	278 g
15    Resanol 15-075	200 g
<b>DOP</b>	25 g

Under stirring it was added under nitrogen:

NC ½	100 g
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The resulting mixture (paint) was then homogenized and the viscosity of the system was measured. It was 4200 mPas.

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